IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

ALERE INC., ALERE SWITZERLAND GMBH, AND SPD SWISS PRECISION DIAGNOSTICS GMBH Plaintiffs-Counterclaim Defendants, v. CHURCH & DWIGHT COMPANY, INC., Defendant-Counterclaim Plaintiff.	1:10-cv-10027-DPW

ALERE INC.'S, ALERE SWITZERLAND GMBH'S, AND SPD SWISS PRECISION DIAGNOSTICS GMBH'S OPENING CLAIM CONSTRUCTION BRIEF

Table of Contents

Page

TABLE OF AUTHORITIES

Page(s)

CASES

STATUTES

OTHER AUTHORITIES

Pursuant to the Court's October 5, 2010 order, and pursuant to Rule 16.6 of the Local Rules of the District of Massachusetts, Plaintiffs Alere Inc., Alere Switzerland GmbH, and SPD Swiss Precision Diagnostics GmbH (collectively, "Plaintiffs" or "Alere") hereby submit this Opening brief on construction of disputed claim terms of U.S. Patent Nos. 7,239,394 ("the '394 patent"), 7,315,378 ("the '378 patent") and 7,317,532 ("the '532 patent").

I. BACKGROUND

The asserted patents are related patents which have the same inventors and derive from the same provisional application. The three patents relate to assays, such as disposable digital lateral flow type pregnancy test devices. As way of example, a typical disposable pregnancy test involves applying a liquid sample (usually urine) to a porous application zone of the device. The liquid sample migrates from the application zone and along the test strip within the device to the testing zone, where the presence the human Chorionic Gonadatrophicin hormone ("hCG" or "the analyte"), an indicator of pregnancy, is detected. The overall detection process works as follows. The test strip includes a soluble substances labeled with colored particles that is designed to specifically bind the analyte in question when the test strip is wetted with sample liquid. The labeled substance forms a complex with the analyte. These complexes are carried along as the liquid moves downstream towards the detection (test) zone on the test strip. The detection zone typically includes an immobilized second substance that is also designed to specifically bind ("trap") the analyte as it is carried by the liquid sample. As the analyte-colored-label complex binds to the immobilized substance and accumulates in the detection zone, the amount of color from the accumulated colored-label accumulates in proportion to the amount of analyte present. The accumulation of analyte is detected by an optical system that detects the color change in the detection zone. The higher the concentration of analyte in the liquid sample, the greater the number of analyte-colored label complexes that get trapped in the detection zone, and the more colored and less reflective the zone becomes. The circuitry inside the reader illuminates the

detection zone and converts the amount of reflected light into an electrical signal. Because the electrical signal is proportional to the amount of light reflected from the detection zone, at any give time the electrical signal is representative of the amount of analyte in the detection zone.

The asserted '394 patent (Declaration of M. Veronica Mullally In Support of Plaintiffs' Opening Claim Construction Brief dated March 25, 2011 ("Mullally Decl.") Exhibit A) is entitled "Early Determination of Assay Results" and discloses an assay device similar to the one described above that can, under certain circumstances (e.g., sample has particularly high or low concentrations of analyte), provide the result of the assay early. Early results are determined before the predetermined time end point of the assay. Prior tests required the user to wait the predetermined amount of time for a result regardless of the analyte concentration, which was not always convenient. Using an optical detection system and a signal processing circuit, the device disclosed in the '394 patent detects the presence and concentration of the accumulated analyte in question (e.g., hCG hormone) in the testing zone and is able to provide those users whose sample contains high (strongly positive) or low (clearly negative) amounts of analyte with reliable assay results at an earlier time, without making the user wait the entire predetermined time for completion of the assay. Although users whose samples contain borderline concentrations of analyte are still required to wait the full predetermined amount of time for the assay to run to completion before they obtain a result. The opportunity to obtain early assay results provides advantages, particularly for pregnancy tests, where the user is naturally anxious to obtain a result as soon as possible.

The asserted '378 patent (Mullally Decl. Ex. B) is entitled "Optical Arrangement for Assay Reading Device" and discloses an inexpensive, typically disposable, assay result reader device for use with lateral flow type assay test strips and involves an optical detection system

and a signal processing circuit to convert the optical signal to an output signal that provides the user with the assay result.

The asserted '532 patent (Mullally Decl. Ex. C) is entitled "Flow Sensing for Determination of Assay Results" and discloses a reader device for use with lateral-flow-type assay test strips where the reader device uses an optical detection system and a signal processing circuit to determine the flow rate (e.g., the time it takes the sample liquid to flow a known distance along the test strip). The assay described above works well when the liquid sample is transported along the test strip at an optimal rate (i.e., within the predetermined limit). For instance, the sample needs to reach the detection zone within the given timescale of the assay, and the assay reagents need to be allowed a certain period of time for the required binding reactions to occur. The actual rate of transport of the sample during each test is affected by various factors. For instance, if the user does not apply the correct amount of liquid, or mishandles the device (e.g. by inverting it), or if the device has a manufacturing defect, the flow rate may be too slow or too fast. If a device were to ignore, or not detect, an inappropriate flow rate, the user would be at risk of being given an assay result that is wrong (e.g. not pregnant, when she is in fact pregnant). The reader device disclosed in the '532 patent rejects the assay and notifies the user that the assay did not perform correctly (e.g. via an error message) if the determined flow rate falls beyond a preset limit, acting as an additional control that increases the reliability of the assay result.

II. LEGAL STANDARD FOR CLAIM CONSTRUCTION

A. General Considerations

As the Federal Circuit has observed, "the claims of a patent define the invention to which the patentee is entitled the right to exclude." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.* 381

F.3d 1111, 1115 (Fed. Cir. 2004)). The construction of claims is a question of law to be determined by the court. *See Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 384 (1996).

Interpretation of the claims begins with an examination of the claim language itself, because "the claims themselves provide substantial guidance as to the meaning of particular claim terms." *Phillips*, 415 F.3d at 1314. Claim terms "are generally given their ordinary and customary meaning." *Id.* at 1312 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). This is the "meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313. When the ordinary meaning of claim language as understood by a person of skill in the art is readily apparent, claim construction "involves little more than the application of the widely accepted meaning of commonly understood words." *Id.* at 1314.

When determining the proper construction of a claim, it is important to remember that a construction which does not encompass the inventor's preferred embodiment in the specification is "rarely, if ever, correct and would require highly persuasive evidentiary support." *Vitronics*, 90 F.3d at 1583. Accordingly, the Federal Circuit cautions against interpreting a claim term to exclude embodiments disclosed in the specification. *See Mattox v. Infotopia, Inc.*, 136 F. App'x 366, 368 (Fed. Cir. 2005) (unpublished) ("Absent statements in the intrinsic record to the contrary, where claim language is plainly susceptible to an interpretation that includes the described embodiments, that interpretation is the better interpretation."); *see also, e.g., Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1305 (Fed. Cir. 2007).

B. Intrinsic Evidence

Although claim construction starts with the claims themselves; the court must also consider intrinsic evidence such as the specification and the prosecution history. *Markman*, 52 F.3d at 379-80; *see also Phillips*, 415 F.3d at 1312. The Federal Circuit has held that "[t]he best

source for understanding a technical term is the specification from which it arose, informed as needed, by the prosecution history." *Phillips*, 415 F.3d at 1315 (quoting *Multiform Desiccants Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1478 (Fed. Cir. 1998)). The specification "may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess." *Id.* at1316. In other words, the inventor can be his own lexicographer and in claim construction the inventor's lexicography governs. *Id.*

"A patent that discloses only a single embodiment is not necessarily limited to that embodiment." *Saunders Grp., Inc. v. Comfortrac, Inc.*, 492 F.3d 1326, 1332 (Fed. Cir. 2007) (citing *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004). This rule exists "not just because section 112 of the Patent Act requires that the claims themselves set forth the limits of the patent grant, but also because persons of ordinary skill in the art rarely would confine their definitions of terms to the exact representations depicted in the embodiments." *Phillips*, 415 F.3d at 1323. Moreover, there is no rule that "a patentee . . . describe in the specification every conceivable and possible future embodiment of his invention." *CCS Fitness Inc. v. Brunswick, Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) (internal citations omitted).

The prosecution history of the patent may also "inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Phillips*, 415 F.3d at 1317. However, care must be taken when looking to the prosecution history as "it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.*

C. Extrinsic Evidence

When the meaning of a term still appears ambiguous after consulting intrinsic evidence, the Federal Circuit has authorized district courts to rely on extrinsic evidence, which "consists of

all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Phillips*, 415 F.3d at 1317 (quoting *Markman*, 52 F.3d at 980). The court is not required to analyze extrinsic evidence in any particular order or barred from looking at any source "as long as those sources are not used to contradict claim meaning that is unambiguous in light of the intrinsic evidence." *Id.* at 1324. Dictionaries are an especially useful source of extrinsic evidence because they "endeavor to collect the accepted meanings of terms used in various fields of science and technology." *Id.* at 1318. While extrinsic evidence is admissible, it is "less significant than the intrinsic record in determining the 'legally operative meaning of claim language.'" *Id.* at 1317 (quoting *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004)).

D. Specific Means-Plus-Function Considerations

Section 112 ¶ 6, of title 35 provides that:

> An element of a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification or equivalents thereof.

35 U.S.C. § 112 ¶ 6.

Under Federal Circuit law "[u]se of the word 'means' in claim language creates a presumption that § 112 ¶ 6 applies." *Trimed, Inc. v. Stryker Corp.*, 514 F.3d 1256, 1259 (Fed. Cir. 2008).

The Federal Circuit has created a two step method for analyzing the mean-plus-function limitation. "First, the court must determine the claimed function. Second, the court must identify the corresponding structure in the written description of the patent that performs the function." *AllVoice Computing PLC v. Nuance Commc'ns, Inc.*, 504 F.3d 1236, 1240 (Fed. Cir.

2007) (quoting *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1332 (Fed. Cir. 2006)).

III. SUMMARY OF THE PROSECUTION OF THE '394 PATENT

The '394 patent was filed on December 19, 2003, and issued on July 3, 2007 with six independent claims (Claim 1, 22, 23, 24, 26, and 27) and twenty one dependent claims. It identifies Stephen Sharrock and Andrew Phelan as inventors and claims priority from a U.S. provisional Application No. 60/508,001 filed on October 2, 2003. Of the twenty seven issued claims of the '394 patent, Plaintiffs are asserting claims 1-5, 8, 10-15, 18, 21-24, 26 and 27.

IV. CONSTRUCTION OF THE DISPUTED TERMS OF THE '394 PATENT

A. "Result of an Assay" (claims 1, 22-24, 27), "Assay Result" (claim 26)

Plaintiffs' proposed Construction	Defendant's Proposed Construction
The conclusion of a test for an analyte, which is positive, negative, or a quantity of the analyte and which is indicated to the user.	No need to construe

Defendant does not provide construction for these terms but Plaintiffs believe that the terms should be construed. Plaintiffs' construction is supported by the '394 specification that describes the result of an assay as "the presence and/or amount of analyte in a test sample" that is indicated to the user as positive, negative, or in a semi-quantitative form. (*See* Mullally Decl. Ex. A at Col. 2:25-28; Col. 5:15-17; Col. 5:61-63). The '394 specification also teaches that this result is communicated to the user, for example in an audible or visual form. (*See Id.* at Col. 5:15-18).

Although Defendant provides no construction, Plaintiffs believe that Defendant intends to pursue a construction which contradicts what is disclosed by the patent. Defendant has indicated that an error message (i.e., disregard assay), elicited when the assay has failed, should be considered to be a result of an assay. But the '394 specification clearly distinguishes between

the "result of an assay" and an error message by stating that "[i]n addition, or as an alternative to displaying the assay result, the device may also display or indicate in some way to the user whether or not the result of the particular assay should be disregarded e.g. because a control result has failed." (*Id.* at Col. 5:25-29). Furthermore, the specification defines "results" of an assay as "positive, negative or a semi-quantitative result." (*Id.* at Col. 5:61-62). Thus, the patent makes clear that a result of an assay is an actual result that informs the user of whether or not the analyte is present or whether the result is positive or negative. An error message is not a result of an assay – it is a quality control feature - it merely tells the user that the assay has failed and must be discarded. (*See Id.* at Col. 5:25-31).

In addition to the unequivocal evidence above, the prosecution history of the related '378 patent, which incorporates the '394 patent and derives from the same provisional application, the same claim term "result of an assay" is expressly distinguished from an error message. (*See* Mullally Decl. Ex. D at 11). There, the inventors make clear that "performing at least one [additional] action . . ." includes "rejecting an assay result or displaying an error condition (such as by alerting a user to disregard the assay) if the determined value is unacceptable, and otherwise displaying a result indicative of the assay . . ." *Id*. (emphases added). Thus, Plaintiffs' construction is fully supported by intrinsic evidence and should be adopted by the Court.

B. "Declaring the result of the assay" (claim 23)

Plaintiffs' proposed Construction	**Defendant's Proposed Construction**
Indicating to the user the conclusion of the test for an analyte as positive, negative, or a quantity of the analyte.	No need to construe.

The arguments regarding the terms "result of an assay" and "assay result" in section A above apply equally to this disputed term. Accordingly, the Court should also adopt Plaintiffs' construction for this term.

C. "A computation circuit responsive to a signal representing the amount of an analyte or the rate of accumulation of an analyte" (claims 1, 26)

Plaintiffs' Construction	Defendant's Construction
A circuit that processes a signal which is indicative of the rate of accumulation or the amount of an analyte (the value of such signal may change over time).	A circuit that processes a signal which is a value reflecting the amount of analyte in a detection zone or the rate of accumulation in the detection zone.

The parties agree that this claim term requires a circuit that processes "*a signal representing the amount of an analyte or the rate of accumulation of an analyte,*" but disagree on what constitutes this "signal." While Defendant's construction limits the signal to a value (i.e., a single number), Plaintiffs' construction treats this signal as having a sequence of values that may change over time. Plaintiffs' construction is supported by the intrinsic record, and buttressed by the dictionary definition of "signal."

The '394 specification teaches that the signal "accumulates during performance of the assay" and that its "accumulation comprises formation or accumulation of a readily detectable substance (e.g. a coloured reaction product)," such as a labeled reagent. (*See* Mullally Decl. Ex. A at Col. 3:4-11). The specification also teaches that the detected signal inside the assay-reader device may be electrical, and when this signal is processed by the device's microcontroller, the signal is in the form of a digital voltage. (*See Id.* at Col. 4: 1-9, Col. 7: 29-40). Fig. 3 below of the '394 patent, called "a graph of typical results of reading (i.e., signal) against time," clearly shows three possible signal profiles (e.g., voltage signals) whose values change over time. (*See Id*., Col. 2:56-57 (emphasis added)). Referring to Fig. 3, the specification makes clear that these time varying signals within the graph are indicative of analyte concentrations being measured. (*See Id.* at Col. 8:52-55, *see also*, Col. 8:40-51). ("The higher the concentration of analyte, the more rapid the rate of accumulation of label in the test zone and the stronger the "signal.'"). Thus, the '394 patent expressly teaches that the claimed signal is indicative of the rate of accumulation or the amount of analyte and that its value may change (vary) over time.

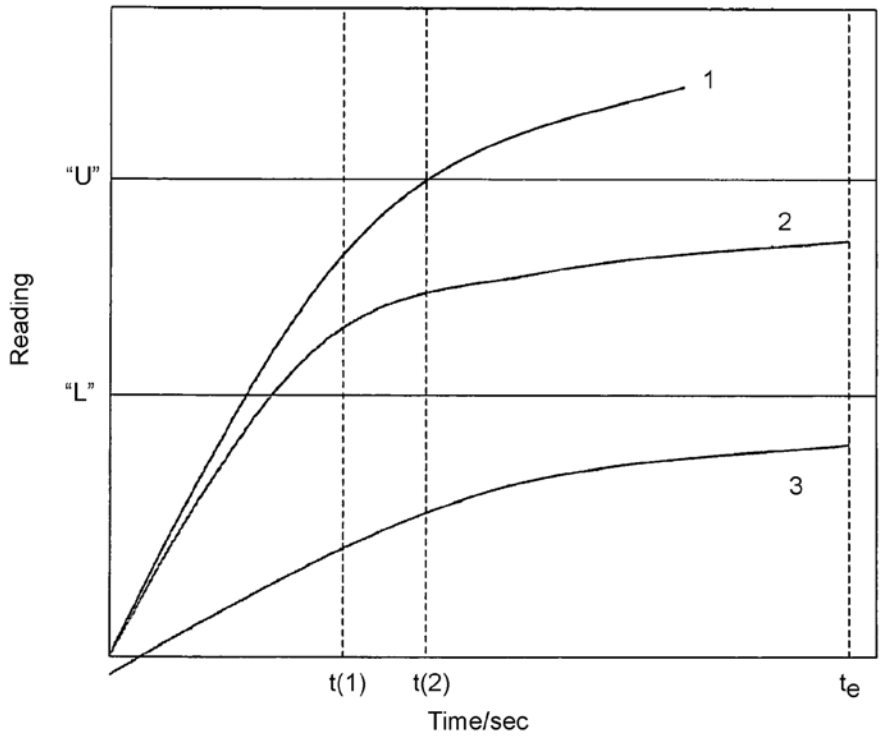

Fig. 3

Moreover, the '394 patent expressly teaches that in addition to processing absolute readings (signals), the invention provides several signal-processing techniques used individually or in combination, including an integration technique which has "the advantage that reading is averaged over time, which smooth[e]s any anomalies." (*Id.*, Col. 9:25-41). If the signal were a single value, none of these signal processing techniques, which are designed to operate on a time varying signal, would be necessary.

Plaintiffs' construction is further buttressed by a dictionary definition of "signal." The IEEE dictionary defines signal as "(13) [A] measurable quantity (e.g., a voltage) which varies in time in order to transmit information. . ." (Mullally Decl. Ex. E at 1047 (emphasis added)).

Accordingly, Plaintiffs' construction, reciting that "the value of such signal may change over time," is supported by the '394 specification and conforms to the dictionary definition. On

the other hand, Defendant's proposed construction, limiting the recited "signal" to a single value, reads out the preferred embodiment and contradicts the ordinary meaning of "signal." Therefore, the Court should reject Defendant's proposed construction for the disputed term and adopt Plaintiffs'.

D. "Signal representing the amount of an analyte" (claims 23, 27)

Plaintiffs' Construction	Defendant's Construction
A signal which is indicative of the amount of an analyte (the value of such signal may change over time).	A signal which is a value reflecting the amount of analyte in a detection zone.

The arguments regarding the term "signal …" presented in section C above apply equally to this disputed term. Accordingly, the Court should also adopt Plaintiffs' construction for this claim term.

E. "First threshold" (claims 1, 23, 26, 27)

Plaintiffs' Construction	Defendant's Construction
A first fixed or adjustable value.	In claim 1, the "first threshold" is a value above which measured values of the signal are regarded as a "first result" and below which they are regarded as a "second result." A "threshold," in general, is considered a value that does not vary throughout the course of a particular assay, but may vary from assay to assay.

There are two main disputes concerning this claim term. Defendant's construction: (1) requires that a "first threshold" be a fixed value throughout the course of an assay, and (2) ties the value of the "first threshold" to both the "first result" and "second result." Defendant is wrong on both counts.

First, discussing threshold values, the '394 specification expressly states that "the values of the at least upper [first] and lower [second] threshold limits may be adjusted during the course of the assay reading." (Mullally Decl. Ex. A at Col. 9:46-48 (emphasis added)). Furthermore, the language of claim 21 expressly states "the computation circuit is further responsive to the

signal to adjust one or both threshold values." Thus, the term "first threshold" cannot be limited to a fixed value, as proposed by the Defendant.

Second, Defendant's attempt to tie the "second result" to the "first threshold" contradicts the claim language and the teaching of the '394 patent. Claim 1 of the '394 patent recites a comparison between "the signal" and a "second threshold," which is less than the first threshold, and requires generation of "an output signal indicative of a second result if the signal is less than the second threshold." (*Id.* at Col. 13:25-30 (emphasis added)). Thus, the claim language makes the "second result" dependent on the "second threshold," not the "first threshold." Moreover, because the "second threshold" is less than the "first threshold," construing the "first threshold" as a condition for the "second result," as advocated by the Defendant, would vitiate the step of comparing the signal to the "second threshold." (*See Id*. at Col. 13:23-24).

Defendant's construction also contradicts the specification. As indicated by the title and content of the '394 patent, the invention is directed to "early determination of assay results" (i.e., before a predetermined end-point "t_e" of the assay). (*See e.g., Id.*, at page 1). In fact, Defendant agrees that the phrase "terminate the assay" in Claim 1 means to "end the analysis before the predetermined end-point of the assay." (Mullally Decl. Ex. I). Therefore, the term "first threshold" should be construed in the context of early determination of assay results.

The "second result" in the context of these claims is a result that is determined early (i.e., before t_e), such as at "t_1" or "t_2" for samples that contain very low concentrations of analyte. Indeed, the only way that a "second result" can be declared is by the reading being less than the "second threshold" before t_e. This early determination depends entirely on the "second threshold" and is independent of the "first threshold." Thus, Defendant's construction, which bases the "second result" on a comparison to the "first threshold," is wrong because it would make the "second threshold" limitation redundant. Because the Plaintiffs' construction is

supported by the specification and the claim language, and Defendant's construction contradicts both, the Court should adopt Plaintiffs' construction.

F. "Compare the signal to a second threshold" (claims 1, 23, 26, 27)

Plaintiffs' Construction	Defendant's Construction
No need to construe "**the signal**"	"The signal" as defined above, that is compared to the second threshold is the same value of the signal that is compared to the first threshold.
"**a second threshold**" A second fixed or adjustable value which is lower than the first threshold value.	In claim 1, the "second threshold" is a value, which if not reached after a certain period of time indicates that the signal value will never reach the first threshold.

As explained above, the claims of the '394 patent recites two separate comparison steps: one comparing the signal to a first threshold ("first threshold comparison"), and the other comparing the signal to a second threshold ("second threshold comparison).[1] With respect to the term "compare the signal to a second threshold" the parties disagree about: (i) whether the same value of the signal must be used in comparisons to both the first and second thresholds, and (ii) about whether a "second threshold" must be a fixed value. The answer to both disputes is "no." We address each in order.

(i) <u>The same signal value need not be used in the two comparisons</u>

The '394 specification indicates that the inventors contemplated using different signal values in the two comparison steps. The specification teaches that the earliest time for an early positive result (i.e., first result), which depends on the signal comparison with the first threshold, can differ from the earliest time for an early negative result (i.e., second result), which depends on the signal comparison with the second threshold. "The earliest time point for a positive (pregnant) result is set at 20 seconds, and the earliest point for a negative result is set at 60 seconds. In other embodiments, of course, other time periods may be set." (*See* Mullally Decl.

[1] The step of comparing the signal to the first threshold is not in dispute.

Ex. A at Col. 10:15-18). Claim 11 also explicitly requires that the first and second threshold comparisons occur at different times "at least about 30 seconds apart." (*Id*. at Col. 13: 58-59). Because the signal can vary over time and at two different time points the signal can have different values, the comparisons done at two different time points can use two different signal values.

The claims also do not require that the same signal value be used in both comparisons or that the two comparison be made at the same time. Instead, the claims merely require that when the comparisons are made, they should use the same "signal" not the same signal value. As discussed in section C above, the "signal" can take on different values over time. Moreover, in a situation where the first threshold and the second threshold are independently adjusted during the assay and the comparison of signal to the first threshold and to the second threshold are done separately and at different times, the second threshold comparison is independent of the first threshold comparison. Because the '394 patent discloses that the signal can vary over time and that the comparisons done at different times would use different values of "the signal," Defendant's construction requiring the use of the same signal value in both comparisons imports a limitation into the claim and improperly attempts to read out a preferred embodiment of the '394 patent. Such construction should be rejected.

(ii) A "second threshold" need not be a fixed value and early determination of the second result is independent of the "first threshold"

The claims require only that the second threshold be less than the first threshold[2]. As addressed in the "first threshold" section above at page 11, the intrinsic evidence makes clear that neither the first threshold nor the second threshold need be fixed. For this reason alone, Defendant's construction the "second threshold is a [fixed] value," cannot be right.

[2] See, e.g., Claim 1 of the '394 Patent.

The "second threshold" in the context of the claims is critical to the determination of the "second result" (an early negative result) and the only limitation pertinent to the construction of the term "second threshold" is that it be lower than the "first threshold." Furthermore, as explained above, there is no requirement that the second threshold be a fixed value.

The only way that there can be a determination of a "second result" is by comparison to the "second threshold." Once it has been determined that the reading has not reached what has been determined as the "second threshold" after a certain period of time (e.g., "t_1" or "t_2"), an early negative result ("second result") is declared and the assay is terminated. There is no additional consideration of that reading in connection with the first threshold. Yet, Defendant's construction states that if the conditions for an early negative determination are met (i.e. the signal does not reach the second threshold), then a positive result will never be achieved at any time (i.e. the signal will never reach the first threshold). But these claims are about determination of early results and Defendant's construction about predicting what happens after that determination is not relevant to the meaning of "second threshold" in the context of these claims. Moreover, Defendant's construction inserts limitations which are not in the claim language and is an improper attempt to conflate the first and second thresholds and should be rejected. The court should construe the term "a second threshold" simply as "a second fixed or adjustable value which is lower than the first threshold."

G. "Assay reaches equilibrium" (claims 23, 26, 27)

Plaintiffs' proposed Construction	Defendant's Proposed Construction
The predetermined point in time at which the reader considers the assay complete for all concentrations of analyte ("t_e")	"equilibrium" That point in time, before the predetermined end point of the assay, after which the rate of change of the signal will not lead to a change in the assay result.

The dispute here is whether equilibrium is reached before the predetermined end-point of the assay (i.e., "before t_e") or at the predetermined end-point (i.e., "before t_e"). Plaintiffs believe it is the latter.

The invention disclosed in the '394 patent is a device that can provide reliable early results of an assay for particularly high or low concentrations of analyte. Early results are determined before the assay has reached equilibrium, which is at the predetermined end-point of the assay. The '394 specification discloses that at the predetermined "end-point, $t_{e,}$ of the assay, at which the reader device considers the assay complete" for all analyte concentrations. (*See* Mullally Decl. Ex. A at Col. 6:1-2 and e.g., Col. 9:14-15). In Figure 3,above at 10, Plots 1, 2, and 3 illustrate typical graphs for high, medium and low concentrations of analyte, respectively. (*See Id.* at Col. 8:56-62]. It is clear from the graphs in Figure 3 that the rate of change of signal for the various analyte concentrations is still changing before t_e and only starts to plateau as they approach the predetermined end-point, $t_{e.}$ As reflected by the signal plateau, there are no significant changes happening in the system at that point, i.e. the assay system is at equilibrium. In this case, that point is reached when the reader can detect no further significant changes in the signal and Figure 3 makes it clear that equilibrium is at $t_{e.}$

In addition, Defendant's construction contradicts the teaching of the patent and finds no basis in the claim language. As discussed above, at equilibrium the signal is essentially constant (the rate of change of the signal is minimal), and as a consequence, the assay result will not change even if one continues to monitor the signal. However, for some analyte concentrations, it is possible to know that the assay result will not change even if the signal is observed further, before the stage where the signal has become essentially constant. Indeed, this is the very heart of the invention – that one does not always need to wait until the signal has reached a plateau before the result can be determined. With reference to Plot 1 in Figure 3 and Col. 9:8-10, the

'394 patent discloses that an "early" positive result can be declared at t_2; yet it is completely clear from the graph that the reading has nowhere near plateaued at that stage, i.e. is not at equilibrium. Defendant is essentially trying to construe "equilibrium" as "the point in time at which an early result can be declared," which is a nonsense in the context of the claim requirements to make the comparisons between the signal and the thresholds before equilibrium has been reached. If Defendant's construction were to be believed, the claims would require that an early result is declared before the point where it is technically feasible to make an early result determination. This was obviously not the intent of the inventors.

Claim 26 requires generating "the output signal indicative of a first result . . . or, alternatively, the output signal indicative of a second result" before the assay reaches equilibrium. (Mullally Decl. Ex. A at Col. 15:21-Col. 16:10). Defendant's construction of the term "equilibrium" as "[t]hat point in time, before the predetermined end point of the assay," would make the claim limitation "before the assay reaches equilibrium" redundant. Indeed, Defendant's construction would force a reading of the claim to be: "before that point in time, before the predetermined end point of the assay . . ." which would render the claim indefinite and invalid as it would be impossible to say at which time the output signal should be generated. Defendant's construction is wrong.

H. "means for determining the rate or amount of signal accumulation" (claim 22)[3]

Plaintiffs' Construction	Defendant's Construction
The term is a "means plus function" term under § 112 ¶6. Function: determining the rate or amount of signal accumulation. The corresponding structure is a CPU or microcontroller programmed to determine the rate	The term is a "means plus function" element under § 112 ¶6. Function: determining the rate or amount of signal accumulation. The corresponding structure is a CPU or microcontroller programmed with

[3] The parties agree that this is a means plus function term under 35 U.S.C. § 112 ¶6.

or amount of signal accumulation by means of the algorithms disclosed in the specification at, e.g., Cols. 3:4-23, 4:5-14, 4:63-5:14, 5:40-42; 5:55-58, 6:19-32; 6:37-49, 8:26-37, 8:40-62, 9:-24-41, 9:64-10:19 and Figs 2-3, or an equivalent structure.	the algorithm disclosed in the patent for achieving the claimed function or an equivalent structure.

The parties agree regarding the function of this "means" term, and also appear to substantially agree regarding the corresponding structure. The sole difference between the two positions is that Plaintiffs' construction cites to sample sections of the '394 specification that disclose the corresponding algorithms used to perform the recited function. As such, Plaintiffs' construction fully complies with the requirement for means-plus-function terms under 35 USC §112 ¶6.

I. "amount of signal accumulation" (claims 22, 24)

Plaintiffs' proposed Construction	**Defendant's Proposed Construction**
No need to construe	A value indicative of the amount of signal representing the amount of analyte in a detection zone.

The parties disagree that this phrase, already a part of the means-plus-function term defined immediately above, requires further construction. Plaintiffs believe that the phrase, which merely refers to an amount of accumulation of a signal, is clear. Not only does Defendant changes this simple four-word phrase into a long-winded seventeen word sentence, Defendant's litigation-inspired construction shifts the emphasis from "accumulation of a signal," which implies a time-dependent process, to "amount of signal," which lacks this time-dependency. Defendant's attempt to obfuscate the meaning of this unambiguous term is consistent with its improper position that "signal" is merely a single value, as opposed to a sequence of values that can vary in time. This argument was already addressed in sections IV. C and D above. Furthermore, the claim language itself proves that the signal is a sequence of values that can vary in time (i.e., signal changes in a time-dependent manner). Specifically, the claim 22 and claim 24 expressly refer to "the accumulation of a signal in a time-dependent manner." (*See* Mullally

Decl. Ex. A at Col. 14:37-42, Col. 15:4-6). Thus, Defendant's improper construction should be rejected.

J. "means for comparing the determined rate or amount of signal accumulation with an upper threshold value" (claim 22);
"means for comparing the determined rate or amount of signal accumulation with a lower threshold value (claim 22)[4]

Plaintiffs' proposed Construction(s)	**Defendant's Proposed Construction(s)**
The term is a "means plus function" term under § 112 ¶6. **Respective Function:** comparing the determined rate or amount of signal accumulation with an upper threshold value;. And means for comparing the determined rate or amount of signal accumulation with a lower threshold value. **The corresponding structure (respectively)** is a CPU or microcontroller programmed to compare the determined rate or amount of signal accumulation with an upper threshold value or an equivalent structure. And a CPU or microcontroller programmed to compare the determined rate or amount of signal accumulation with a lower threshold value or an equivalent structure. **"Upper threshold value":** An upper fixed or adjustable value. **"lower threshold value:"** A lower fixed or adjustable value.	This is a "means plus function" element under § 112 ¶6. **Function:** comparing the determined rate or amount of signal accumulation with an upper threshold value. And means for comparing the determined rate or amount of signal accumulation with a lower threshold value. **The corresponding structure** is a CPU or microcontroller programmed with the algorithm disclosed in the patent for achieving the claimed function or an equivalent structure. --- **"The"** signal accumulation as defined above, that is compared with the "lower threshold" is the same value that is compared with the "upper threshold value." --- **upper threshold value:** a value below which the determined value of signal accumulation is regarded as a negative result and above which values are regarded as a positive result. **"lower threshold value"** A value, which if not reached after a certain period of time indicates that the signal accumulation will never reach the upper threshold value. A "threshold," in general, is considered a value that does not vary throughout the course of a particular assay, but may vary from assay to assay.

[4] The parties agree that this is a means plus function terms under 35 U.S.C. § 112¶6.

The parties agree about the respective functions of the above two mean-plus-function terms, and also appear to substantially agree about the respective corresponding structures. The parties' sole dispute about the corresponding structures lies in the fact that Defendant's construction requires a whole algorithm for a function achieved by a basic "compare" instruction. "Compare" is a simple concept well know in both software and hardware fields. (*See* Mullally Decl. Ex. E at 200). Thus, while it may be appropriate to refer to a separate algorithm in cases of complex corresponding structures, there is no need to do so here. Accordingly, Plaintiffs respectfully request the Court to adopt their respective constructions for both "means" terms.

The parties also disagree about constructions of the terms "upper threshold value" and "lower threshold value," included in the corresponding "means" terms. The specific disputes are essentially the same as for the terms "first threshold" and "second threshold," discussed in section IV.E and F above. Thus, Plaintiffs' arguments presented in those two sections also apply to the terms "upper threshold value" and "lower threshold value."

Lastly, Defendant wants to define "the" in "the determined rate or amount of signal accumulation" of the two "means" terms as requiring that the same value be used for both comparisons. This dispute is identical to the one presented in section IV.F above. Accordingly, the Court's ruling in that dispute would also be determinative here.

V. SUMMARY OF THE PROSECUTION OF THE '378 PATENT

The '378 patent was filed on April 1, 2004, and issued on January 1, 2008 with eight independent claims (Claim 1, 12, 13, 15, 18, 22, 30 and 33) and twenty six dependent claims. It identifies Andrew Phelan and Stephen Sharrock as inventors and claims priority from a U.S. provisional Application No. 60/508,001 filed on October 2, 2003. Of the thirty four issued claims of the '378 patent, Plaintiffs are asserting claims 18 and 20.

VI. CONSTRUCTION OF THE DISPUTED TERMS OF THE '378 PATENT

Both the '378 and '394 patents derive priority from the same provisional application Ser. No. 60/508,001 and use the same terminology. (Mullally Decl. Exs. A and B). Although the parties disagree regarding construction of four claim terms of the '378 patent (Mullally Decl. Ex. F), the parties agree that these terms should be construed in the same way as for the '394 patent. Accordingly, the Court's construction of these terms in the '394 patent will also apply to the '378 patent.

VII. SUMMARY OF THE PROSECUTION OF THE '532 PATENT

The '532 patent was filed on December 19, 2003, and issued on January 8, 2008 with seven independent claims (Claim 1, 15, 18, 19, 21, 24 and 26) and twenty dependent claims. It identifies Stephen Sharrock and Andrew Phelan as inventors and claims priority from a U.S. provisional Application No. 60/508,001 filed on October 2, 2003. Of the twenty seven issued claims of the '532 patent, Plaintiffs are asserting claims. 19, 21, and 24-27.

VIII. CONSTRUCTION OF THE DISPUTED TERMS OF THE '532 PATENT

A. "Sample application zone" (claim 19), "Sample receiving zone" (claims 24, 26), "First portion of the liquid transport carrier" (claim 21)

Plaintiffs' proposed Construction	Defendant's Proposed Construction
A region on the liquid transport carrier where a liquid sample is applied and is upstream from the first and second spaced-apart zones.	A region on the liquid transport carrier where a user applies the liquid.

The parties agree that "sample application zone," "sample receiving zone," and "first portion of the liquid transport carrier" (collectively "Sample Application Zone") refer to a region on the liquid transport carrier where the user applies the sample. However, the parties disagree as to whether this region is upstream from the first and second spaced-apart zones. The claim language and the specification clearly support Plaintiffs' construction.

The claim language of the '532 patent distinguishes between the Sample Application Zone and the first and second spaced-apart zone and requires that there be a flow path for the liquid sample to travel from the Sample Application Zone, where the sample is applied by the user, downstream along the liquid transport carrier to the first and second spaced-apart zones. Specifically, claim 19 states that "the liquid transport carrier being configured to support flow of a liquid applied to a sample application zone of the liquid transport carrier to at least first and second spaced-apart zones." (Mullally Decl. Ex. C at Col. 16:55-58). Similarly, claim 24 states "the sample receiving zone, the first zone, and the second zone being spaced apart from one another along a flow path defined by the test strip." (*Id.* at Col. 17:45-48). Also, claim 26 states "allowing a liquid to advance from a sample receiving zone to a first zone and subsequently to a second zone…" (*Id.* at Col. 18:18-19). Thus, the claim language makes clear that the liquid sample is applied to the Sample Application Zone and then flows downstream to the first and second spaced-apart zones. Accordingly, the Sample Application Zone must be upstream from the first and second spaced-apart zones, as construed by Plaintiffs.

Likewise, the '532 specification supports Plaintiffs' construction because it teaches that in order to conduct an assay measurement in accordance with the claimed invention, a sample is applied to a sample receiving zone, which then migrates along the test strip and reaches the first zone. (*See Id.* at Col. 8:20-27). Thus, the Sample Application Zone must be located upstream from the first and second spaced-apart zones. Because it is fully supported by the claim language and the specification, the Court should adopt Plaintiff's construction.

B. "First and second spaced-apart zone of the liquid transport carrier" (claims 19, 21)
"the first zone of the liquid transport carrier"(claims 24, 26)
"the second zone of the liquid transport carrier"(claims 24, 26)

Plaintiffs' proposed Construction	**Defendant's Proposed Construction**
A first zone on the liquid transport carrier separated by a known distance from a second zone on the liquid transport carrier.	No need to construe.

Defendant does not provide construction for these terms but Plaintiffs believe that the terms should be construed. Plaintiffs believe that by refusing to construe these terms, Defendant is attempting to include an assay device where the distance between the two zones is unknown. Thus, the dispute is whether the asserted claims of the '532 patent requires that the first and second spaced-apart zones be separated by a known distance. Plaintiffs believe that it does.

The '532 specification expressly teaches calculation of an absolute or a relative flow rate by determining the time it takes the liquid to travel a known distance along the liquid transport carrier. The specification states that where the distance between the two zones is known, the relative or absolute flow rate "can be readily calculated by measuring the amount of time which elapses between detection of the liquid sample at the first and second zones." (*See* Mullally Decl. Ex. C at Col. 4:37-41). The '532 specification repeatedly makes it clear that the distance between the two spaced apart zones must be known: "[t]he distance between the two zones . . . may be chosen to be any that is convenient and is likely to depend upon the nature of the analyte . . ." (*Id*. at Col. 4:45-50). It stands to reason that a distance cannot be "chosen" and remain unknown. Furthermore, the '532 specification discusses how the light sources in the housing must be "correctly aligned with the respective zones to be measured." (*See Id*. at Col. 7:60-63 and Col. 13:66-Col. 14:9). Thus, the specification and common sense make it clear that the device cannot be built without the distance between the two zones to be measured being known.

Plaintiffs do not understand why Defendants will not agree that the distance between the two spaced-apart zones must be known as this is an absolute prerequisite to measuring flow rate by measuring time. Defendant's position is also inconsistent with its own construction of the term flow-rate as speed (time per distance unit), which requires that the distance between the two spaced-apart zones be known. (*See* Section D below). There is simply no way to determine a flow rate without knowing the distance that the liquid flows in the time taken. Indeed, the distance between the first and second spaced-part zones must be known, otherwise the invention disclosed in the patent would be inoperable. Accordingly, the Court should adopt Plaintiffs' construction.

C. "A light source system configured to selectively illuminate each of the first and second spaced-apart zones" (claim 19)

Plaintiffs' Proposed Construction	**Defendants' Proposed Construction**
No need to construe	To independently choose which of the first and second zones to illuminate.

Not only do the Plaintiffs believe that the term is clear on its face and does not need a construction, they also believe that Defendant's proposed construction contradicts the claim language and the specification.

The claim term is straightforward, and merely refers to a light source system positioned to illuminate selected areas of the liquid transport carrier, i.e., the first and second spaced-apart zones. This is supported by the '532 specification, which states that "[t]he light sources and corresponding photodetectors are preferably so aligned such that during use, light from the light source or sources falls upon the respective zones on the porous carrier." (Mullally Decl. Ex. C at Col. 8:1-6). For example, in one light-source-system embodiment, the '532 specification teaches that the selective illumination is accomplished by using light-impermeable baffles that restrict the illumination to selected zones. "Each LED is optically isolated by light-impermeable baffles 40, which ensures that the various LEDs are capable of illuminating only its respective zone of

the test strip."(*Id*. at Col. 13:66-Col.14:1 (emphasis added)). Thus, the claim term is clear and needs no construction.

Defendant's proposed construction is wrong and misses the meaning of the term entirely. The claim language requires the optical system to illuminate each spaced-apart zones, the first and the second. Defendant's construction would omit the requirement of illuminating both zones, and could be met by merely choosing to illuminate just a single zone. Thus, Defendant's construction contradicts the plain meaning of the claim language and cannot be correct.

The '532 specification discloses a number of preferred optical system embodiments, including an embodiment with a single light source. "In a preferred embodiment, a suitable optical system comprises at least two light sources and at least one photodetector, or conversely at least one light source and at least two photodetectors, so as to be able to make optical measurement at least two spatially separated zones of the liquid transport carrier." (*See Id.* at Col. 5:44-49 (emphasis added)). In a single-light-source embodiment, both spaced-apart zones are illuminated jointly at the same time, not independently. But the area to be illuminated, i.e., the zone, on the test strip is specifically selected. Not only is Defendant's construction wrong because it misses the mark of selecting the area to be illuminated but its construction would exclude a preferred embodiment of the invention. Defendant's construction should be rejected.

D. "Processor configured to determine a flow rate of a liquid" (claims 19,24) "Determining a flow rate of the liquid along the liquid transport carrier" (claim 21)

Plaintiffs' Proposed Construction	Defendants' Proposed Construction
[A processor designed] to determine the time it takes the liquid to travel a known distance along the liquid transport carrier.	To calculate the speed (i.e., distance per time unit) of the liquid's flow.

Here the dispute is whether "determining a flow rate" between two spaced-apart zones involves the illumination that the mathematical step of calculating a speed (i.e., actually dividing the distance by the time taken) must be carried out, or whether simply measuring the time taken

to travel a known distance, without then applying that mathematical step of dividing the two, will satisfy this claim term. Plaintiffs believe that there is a minimum requirement to measure the time the liquid takes to travel a known distance and while a calculation of speed may be sufficient to meet the claim such calculation is not required by the claim language.

In one preferred embodiment, the '532 specification expressly teaches calculation of a flow rate by determining the time it takes the liquid to travel a known distance along the liquid transport carrier. "If the distance between the two zones is fixed and/or known, the relative or absolute flow rate of the liquid sample can be readily calculated by measuring the amount of time which elapses between detection of the liquid sample at the first and second zones." (Mullally Decl. Ex. C at Col. 4:37-41 (emphasis added)). "In general terms the flow rate is calculated by detecting the change in reflected light intensity associated with the arrival of the liquid sample at a particular zone, and determining the time which elapses between the arrival of the liquid sample at the various zones." (*See Id.* at Col. 12:32-36 (emphasis added)). Furthermore, the '532 specification provides an example of this type of flow rate determination and expresses the flow rate as a measure of time, not speed. "The maximum and minimum flow rates are set at 5 and 40s, respectively. Thus, any sample that takes longer than 40s is rejected as being too slow (which may be due to undersampling), any sample that is quicker than 5s is rejected as being too fast . . . In other embodiments, of course, the upper and lower flow rate limits can be set at a wide variety of values. . . " (*See Id.*, Col. 13:11-33 (emphasis added)).

Accordingly, because the Plaintiffs' proposed construction includes patentees' preferred "flow rate" embodiment, and Defendant's proposed construction excludes it, the Court should reject Defendant's construction and adopt Plaintiffs'.

E. "Determining the presence of an analyte" (claims 25, 27)

Plaintiffs' proposed Construction	**Defendant's Proposed Construction**
Determining the presence or the quantity of an identified chemical or substance.	No need to construe.

Defendant does not provide construction for the term but Plaintiffs believe that the term should be construed. Plaintiffs believe that by refusing to construe this term, Defendant is intending to pursue a construction of "analyte" that would cover any test that measures any feature or characteristic of a biological system and not just an assay that measures the presence or concentration of a known chemical or substance.

With regard to the construction of the term "analyte," Plaintiffs' construction is supported by intrinsic evidence, as well as dictionary definitions of "analyte" which indicate the accepted meaning understood by those of skill in the art. The '532 specification specifically teaches that the presence of "[a]ny suitable analyte or analytes of interest may be measured." (Mullally Decl. Ex. C at Col. 4:18-19). The specification also provides several examples of analytes.

> Analytes that are particularly of interest include proteins, haptens, immunoglobulins, hormones, polynucleotides, steroids, drugs infectious disease agents (e.g. of bacterial or viral origin) such as Streptoccocus, Neisseria and Chlamydia, drugs of abuse, and biological markers such as cardiac markers and so on.

(*Id*. at Col. 4:19-24). Each analyte of interest disclosed in the specification is an identified chemical or substance whose presence or concentration in the sample fluid can be measured (quantitatively and/or qualitatively) in an assay.

As dictionary definitions of "analyte" make clear, one of skill in the art would understand "analyte" to mean an identified chemical or substance that is undergoing analysis: "a chemical substance that is the subject of chemical analysis" and "any substance or chemical constituent of blood, urine, or body fluid that is analyzed" (*See* Mullally Dec. Ex G at 45 and Ex H at 66).

With regard to the term "determining the presence of an analyte," the '532 specification teaches that the device disclosed can "optically measure analyte concentrations quantitatively and/or qualitatively." (Mullally Dec. Ex C at Col. 2:53-57). The specification discloses that the amount of light reaching the photodetector depends on the amount of colored label present and therefore the amount of analyte, thus the amount of analyte present in the sample may be determined. (*See Id*. at Col. 8:8-12). Because Plaintiff's construction is supported by the '532 specification and conforms to the understanding of those skilled in the art, the Court should adopt Plaintiffs' construction.

F. "Outputting a value indicative of the presence of the analyte" (claim 27)

Plaintiffs' proposed Construction	**Defendant's Proposed Construction**
Conveying information which indicates the presence or the quantity of the identified chemical or substance.	No need to construe.

Defendant does not provide construction for the term but Plaintiffs believe that the term should be construed. The '532 specification teaches that the "assay result reading device will comprise some manner of indicating the result of the assay to the user. "This may take the form, for example, of an audible or visible signal." (Mullally Dec. Ex. C at Col. 8:62-65). The specification provides, as an example of such visible signal, an LCD display. (*See Id*. at Col. 8:66-Col. 9:4). Thus, the specification fully supports Plaintiffs' construction that the device conveys information to the user that indicates the presence or quantity of the analyte being analyzed.

The arguments regarding the term "analyte" in section VIII.F above apply equally to this disputed term. Accordingly, the Court should adopt Plaintiffs' construction.

IX. CONCLUSION

Based on the foregoing evidence and arguments, Plaintiffs respectfully request that the Court adopt their claim construction for the disputed claim terms. Furthermore, the Parties have

agreed on the construction of eight claim terms. These terms and their respective agreed to constructions are presented in Exhibit I and Plaintiffs respectfully request that the Court adopt these agreed to constructions for this case.

Dated: March 25, 2011

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that this document was filed through the ECF system on March 25, 2011 and will be sent electronically to the registered participants as identified on the Notice of Electronic Filing (NEF).

/s/ *M. Veronica Mullally*
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